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The content of BIM short courses in Vietnam: current approaches and recommendations

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Abstract:

In the context of spontaneous BIM education and training, there are many doubts in the Vietnamese Construction Industry about the feasibility of the Government's Scheme to adopt BIM in building construction and facility management. Although the Ministry of Construction has issued the framework of the BIM curriculum, the reference and use in practice of this framework is still scant. This paper outlines the status of BIM training in Vietnam and identify the real needs of the trainees. On that basis, recommendations are made for the Vietnamese construction industry to dedicate appropriate human resources to implement BIM properly and efficiently.

Keywords: BIM education, BIM training, BIM short courses, educational framework, BIM human resource

1 Introduction

Many scholars affirm that human resource plays the vital role in successful BIM adoption and implementation (Tsai, Mom, & Hsieh, 2014; Won & Lee, 2010; Won, Lee, Dossick, & Messner, 2013), especially for late adopters like Vietnam. According to Succar and Sher (2013), there are 3 ways to improve human resources' capacity: higher education, on – the – job training, and professional training. Where undergraduate and postgraduate educational curriculums have no plan for developing professions related to BIM in Vietnam, it is necessary to have short-term courses with the aim of improving both quantity and quality of BIM human resources to compensate. In October 2017, The Vietnamese Ministry of Construction issued Decision No. 1056/QĐ-BXD announcing the pilot phase of the BIM educational framework for agencies and organizations to apply in the BIM implementation process. In Vietnam, no research has been conducted that can tell us about BIM education and training, this paper is therefore based mainly on surveys and interviews in order to fill this identified gap in knowledge. The authors analyse the status quo and industry needs, point out the training gap and give recommendations. This study attempts to provide the first perspective on this topic, suggest directions for BIM educational providers and further research.

2 Literature Review

The General Statistics Office (2018) published a press release on the socio-economic state in the first 6 months of 2018 that the construction sector maintained a decent growth rate of 7.93%, contributing 0.48 percentage point to overall growth of the national economy. The Vietnamese construction industry is expected to expand until at least 2021, due to massive investments in transport infrastructure, energy and utilities and affordable

housing projects towards a better living condition for citizens. Global Construction Perspectives and Oxford Economics (2011) forecasted that the growth rate of Vietnam's construction industry by 2020 will be similar to that of countries like China and India. According to the Government's plan for human resources development in Vietnam (Vietnamese Government, 2011), the labour force in the construction sector nationwide will reach from 8 to 9 million people by 2020 with 65.0% trained workers. Correspondingly there will be a need of at least 0.07% (about 5,600 people) post graduates, 2.64% (about 210 thousand people) graduates. However, at present, there are only 29 universities delivering professional courses and supplying approximately 25,000 higher-education-degree holders per year in maximum for the whole construction industry (Dainam University, 2018). Whilst the cumulative number of well-educated workers from previous years is even less positive, since higher education in the AEC industry has begun to emerge recently in Vietnam. It can be clearly seen that there are discrepancies between supply and demand for postgraduates and graduates.

Early research, for example Berwald, (2008) and Denzer & Hedges, (2008) concentrated on making a shift from teaching CAD to teaching BIM in standalone courses. These were later followed by research that investigated the method and effect of incorporating BIM into college courses. Two main topics emerge in recent studies upon the BIM curriculum including: (1) examining issues concerning interdisciplinary and interoperability of collaborative BIM processes for instance (Abbas, Din, & Farooqui, 2016; Ali, Mustaffa, Keat, & Enegbuma, 2016; Hsieh, Amarnath, & Tsai, 2017; Krezel, Osman-Schlegel, & Hosseini, 2016; Puolitaival, Boot, GhaffarianHoseini, & Park, 2017; Yusuf, Embi, & Ali, 2017; Zhang, Schmidt, & Li, 2016), and (2) extensive research into innovative pedagogical approaches in order to carefully trade-off between advantages and disadvantages in educational outcomes of BIM courses (Adamu & Thorpe, 2016; Hernández, Fernández-Morales, & Mir, 2016; Hjelseth, 2017; Shelbourn, Macdonald, McCuen, & Lee, 2017; Wu & Luo, 2016). Notwithstanding, there has been no research examining in detail the contents of BIM short/standalone courses to date.

3 Research Methodology

The authors expect to achieve the research objectives by undertaking a mixed analysis research approach as depicted in Figure 1. Initially, the current situation is analysed using online surveys. Potential BIM course attendees' expectations are probed in terms of length, fee, instructor, topic. In parallel, data on available BIM courses delivered across Vietnam is subject to advertisement analysis. The findings are supplemented through further investigation, using interviews with the applicants for the BIM for practitioners course¹. These applicants have experience in using BIM, so gathering their feedback on course content proposed by the Ministry of Construction adds value to the findings. Subsequently, the authors carry out a gap analysis to figure out how the identified industry and academic needs might be addressed to ensure the right track for the adoption of BIM in Vietnam. As for the appropriateness of the research approach, Boynton and Greenhalgh (2004) argued that a questionnaire is suited for "a mixed methodology study" as this research is. On the other hand, interviews are especially valuable for getting the story behind a participant's encounters (McNamara, 1999). The questioner can seek after in-depth data around the subject. Interviews may be valuable as a follow-up to certain respondents to questionnaires, e.g., to encourage explore their reactions. In addition,

¹ The course was taking place at NUCE from 24 to 27/1/2018 delivered by domestic and foreign experts from industry and academia

interviews are for the most part simpler for the respondent, particularly on the off chance that what is looked for is an assessment or viewpoint (Valenzuela & Shrivastava, 2002). More importantly, not many know about the BIM Training Framework during the pilot phase in Vietnam proposed by MOC. The terms and definition upon BIM education, not to mention, have been a controversial cutting edge for Vietnam so far. The interviewers, therefore, had to make numerous explanations and justifications. Both questionnaire and interview were semi-structured which permits for the investigation of patterns depicting what is happening within the BIM short-term education context. At the same time, it unveils better criticism which will give understanding into clarifications for what is happening and participants' conclusions, states of mind, sentiments and discernments.

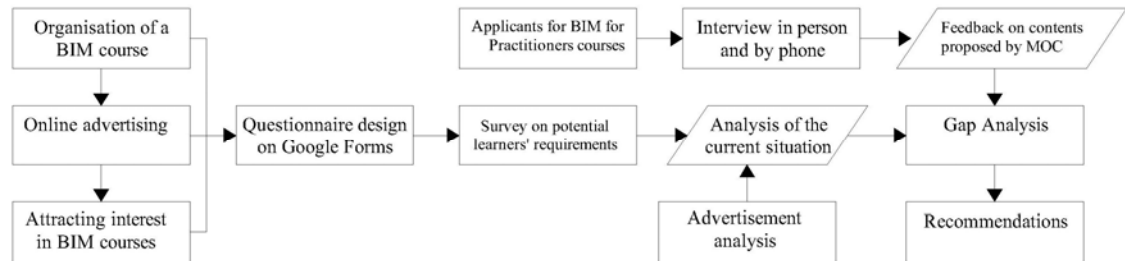


Figure 1. Research method of the paper

4 Findings and Discussion

4.1 Analysing the status quo of BIM courses

An online search enquiry was undertaken for Construction Training Courses showed the increase in attractiveness of training with BIM in Vietnam. By using the keyword “đào tạo BIM” meaning “BIM training and education”, the Google searching engine found 2,850 results in 0.40 seconds. Comparing with “đào tạo dự toán” meaning “cost estimation training” – one of the most popular short-term courses in Vietnamese AEC industry in decades – produced 7,420 results in 0.46 seconds. This enquiry is a country-specific data because the language used for the search was Vietnamese. Table 1 shows the details of 10 random BIM-course providers whose websites contain sufficient information.

Table 1. Survey on 10 organizations providing BIM courses

No.	Titles	Providers	Location	Short/Long Term	Online (Distance learning)
1	Architectural designer in BIM	Computer Engineering Center - Ho Chi Minh University of Science and Technology	HO CHI MINH	Long-term ²	
2	BIM Manager	RDSIC ³ – NUCE	Hanoi	Short-term	
3	BIM Manager	REDSUN	HO CHI MINH	Long-term	Yes
4	BIM Modeler	BIM Hanoi	Hanoi	Short-term	
5	Varied	BIM-ASM	HO CHI MINH	Short-term	Yes
6	Revit	Lophocrevit	Hanoi	Short-term	

² Long-term in this paper is understood to be longer than 3 months

³ The center of Research & Development System of Informatics in Construction

7	Revit	Huy Training	HO CHI MINH	Short-term	Yes
8	Revit	Hoc BIM	HO CHI MINH	Short-term	Yes
9	BIM Software	Anabim	Hanoi	Short-term	Yes
10	BIM Software	BIM Express	HO CHI MINH	Short-term	Yes

Half of the organizations surveyed teach BIM, of which 3 organizations specialized in teaching Revit skills, 2 organizations specialized in the teaching of setting up models to enhance the learners' awareness of the essence of the BIM Modeller role, and the BIM Coordinator role. There is a striking point that 2 out of 10 organizations train BIM Managers – those who will manage the BIM process, policy, technology and human resources (course content shown in Table 2). It can be seen that not only do Vietnamese people train BIM modellers, but they also train BIM Managers. Because BIM in Vietnam is in the early stage of adoption, the BIM Modeller is still considered as the foundation for implementing domestic and foreign projects through the adoption of outsourcing.

Table 2. BIM Manager Training Program at RDSiC

BIM Manager Day 1 (9.00AM to 12.00PM) : BIM Lifecycle – Designing process management	<ul style="list-style-type: none"> - The basic value of BIM and goals of BIM; - Information flow in design with integrated project delivery and BIM guidelines (BIM implementation plan, level of detail, and copyright); - BIM guideline from Singapore, USA and UK; - Development of the roadmap for adopting BIM
BIM Manager day 1 (1.30PM to 4.30PM): BIM optimization in basic design and technical design	<ul style="list-style-type: none"> - Training BIM team BIM for getting started a project - BIM team management and communication - Analysing the size and shape of the building - BIM for sustainable construction
BIM Manager Day 2 (9.00AM to 12.00PM): BIM optimization in pre-construction phase and construction management	<ul style="list-style-type: none"> - The value from the coordinated BIM model - BIM for quantity taking off - BIM for the construction processes - BIM-CM (price plan, price analysis, product control)
BIM Manager Day 2 (1.30PM to 4.30PM): BIM optimization in infrastructure management and additional works	<ul style="list-style-type: none"> - The requirement for BIM from the client - As-built BIM model and its' benefits to the client - Optimizing the as-built BIM model for facilities management - The console of BIM linked facilities management

Extracted from the website rdsic.edu.vn

BIM courses are currently only carried out in Ho Chi Minh City and Hanoi. These are the two largest cities in Vietnam which almost all people doing BIM-related works are flocking to. Regarding course duration, 8 out of 10 courses are short-term, varying from 38 to 96 hours long per course. An article posted on The BIM Hub website in November 2016 remarked that BIM courses in Vietnam are currently delivered through short-term format at privately run training centres and internal training company departments as well as some of the universities. They are all in a hands-on style, focusing on the software tutorial rather than “a proper BIM curriculum or long-term training degree” (Pham, 2016). Notably, BIM training service providers in Vietnam have been so far using a modern learning method – distance learning - which has a high accessibility for learners. This is also encouraging learners in proactively widening their know-how through learning from experts' experience as well as stopping the “listening then writing” situation dominant in the past.

4.2 Reviewing requirements and expectations of learners

By referencing the contents of two BIM courses in Singapore, the authors designed a short questionnaire in Vietnamese via Google Forms. The questionnaire was circulated to Facebook groups of people who had shown their interest in BIM education and training. 111 responses were received in May 2018, of which, 102 responses were valid. Designers were the most engaged respondents with 34 valid responses (30.6%).

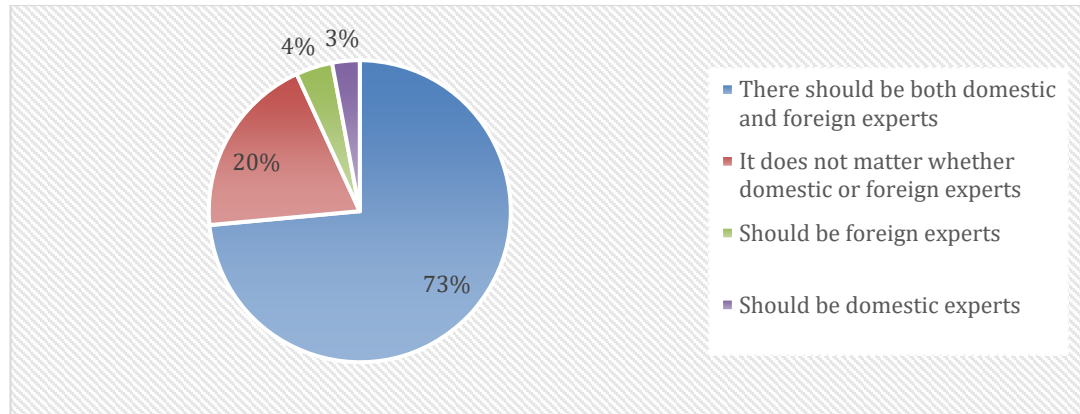


Figure 2. The response to the question "Do you think that BIM courses are better delivered by foreign experts (from successful BIM countries)?"

Figure 2 shows that the majority of respondents, i.e. 73%, want to learn BIM from both local and foreign experts. This can be viewed as a safe and reasonable choice, as learners can learn from successful practices from overseas predecessors, and to consider lessons learned from domestic experience.

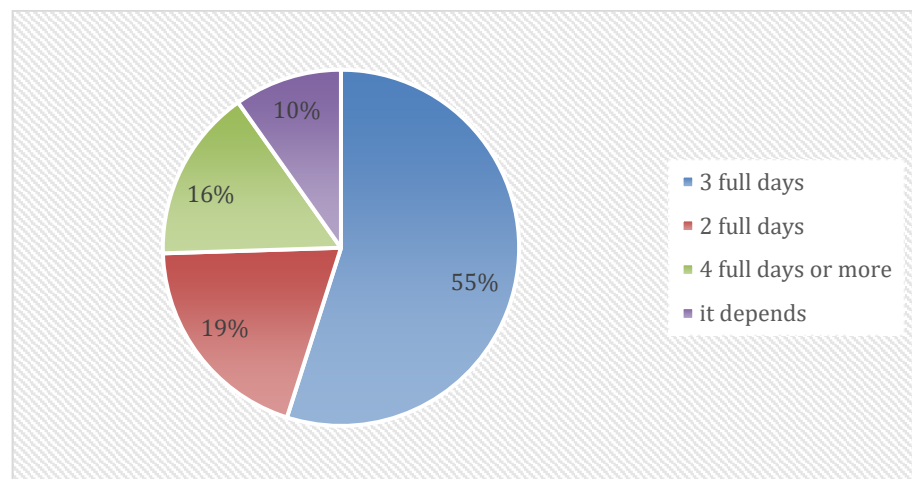


Figure 3. The response to the question "What is the appropriate length of the BIM course?"

When asked about the appropriate duration of the BIM course, more than half of the respondents preferred the three-day (six-session, 24-hour) option shown in Figure 3. This proves that the learners sampled in Vietnam preferred short courses. This also put in doubt the viability of long-term BIM courses, that there might be no small difficulty in attracting attendees.

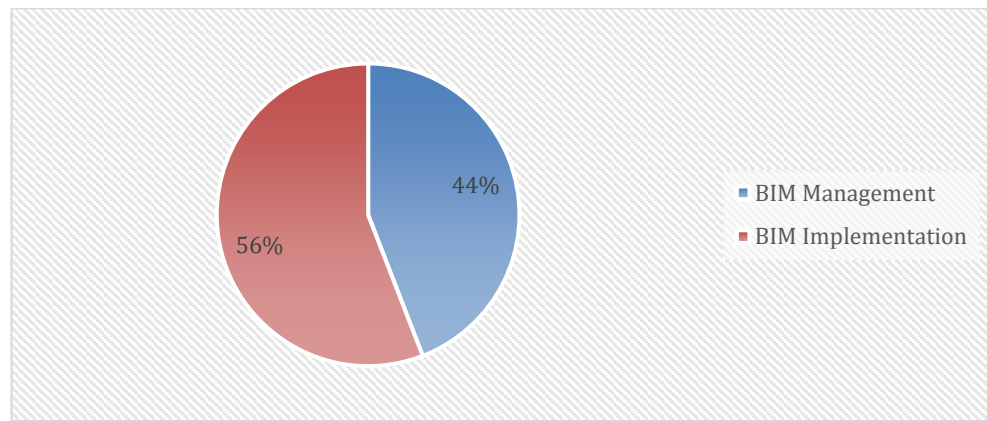


Figure 4. Feedback results for the question " Would you like to participate in the course for the purpose of understanding to directly implement BIM activities in the project or to manage the BIM implementation in the organization?"

The results shown in Figure 4 show that the demand for BIM training amongst those sampled in Vietnam is currently somewhat concentrated in the implementation segment. This is justified when BIM is just seen as a stepping stone in Vietnam. However, there are a few organisations that have been around and using BIM for quite some time, so the view that BIM is in the initial stage of implementation is not consistent across the whole industry. However, Vietnam is not without urgent need for BIM training for managerial levels. Middle managers and senior managers in construction firms are gradually realizing the importance of BIM and this may be the key success factor for the BIM roadmap in Vietnam, similar to other preceding countries (Ding, Zuo, Wu, & Wang, 2015; Eadie, Browne, Odeyinka, McKeown, & McNiff, 2013; Won & Lee, 2010).

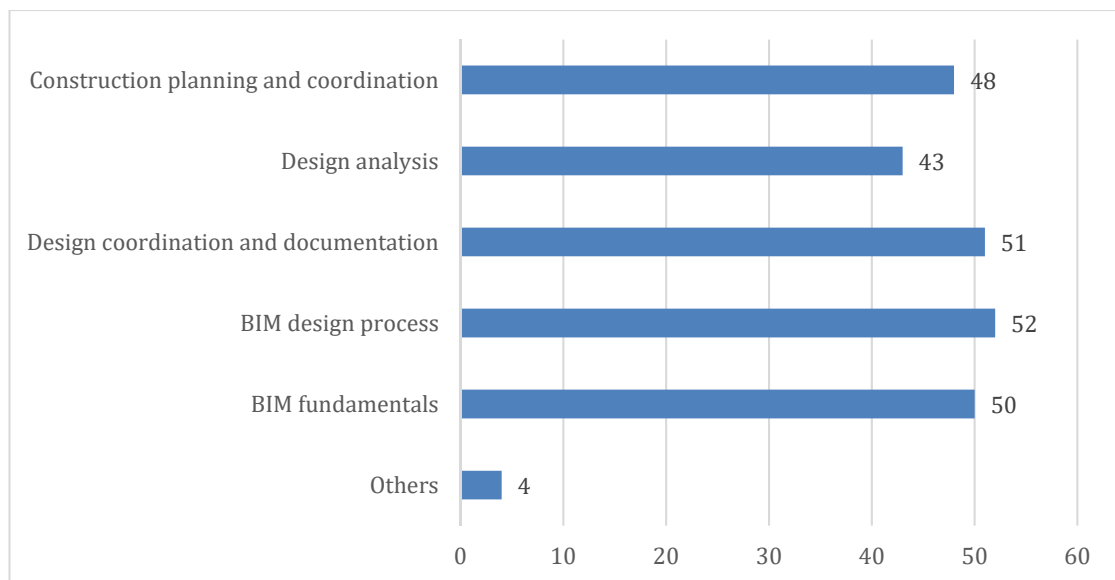


Figure 5. The response to the question of "What content you think is needed for the BIM Implementation course"

As reflected in Figure 5, with the exception of the four 'other' responses made in the open response text box, the respondents paid almost the same attention to all items raised in the course of BIM Implementation as follows:

- BIM fundamentals
- BIM design process

- Design coordination and documentation
- Design analysis
- Construction planning and coordination

This result shows that the respondents wish to learn a broad range of topics from the course, not a single or specific in depth. This approach is relatively suitable for a short-term course but requires more effort from the trainees to grasp the range of topics covered. Otherwise, the course will not make an impact on the attendee and the time will be wasted – described in the Vietnamese proverb as ‘riding a horse to view flowers’.

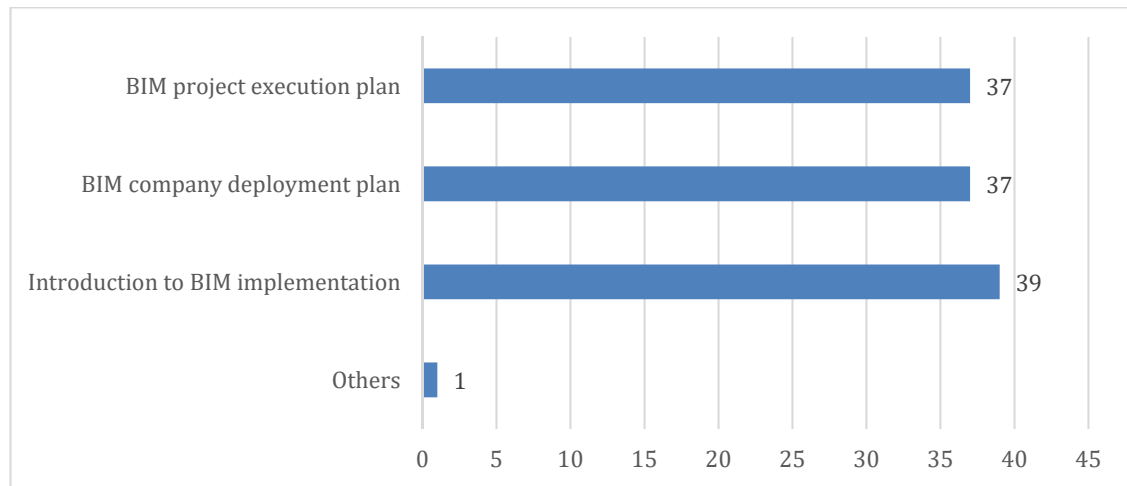


Figure 6. The response to the question "What is the content you need for the BIM Management Course"

Similar to the BIM implementation course, there is no sharp difference among topics. Looking at the details as displayed in Figure 6, the respondents indicated that the "Introduction to BIM Implementation" was the most necessary element, followed by the "BIM Step-by-Step Plan for Enterprises" and "BIM project execution plan". It is easy to understand that BIM implementation is the sound foundation for BIM management. Following this, respondents want to get "quick wins," or "instant noodles" through pilot projects. This approach promises to bring results soon, and the result is quick to see. Still, high-level and longer-term strategies are needed, as stated in the following quote from the BIM literature:

“When it comes to BIM, many think of an advanced software system. However, the transformation into BIM is more than a technological transition, it's a cultural change, a revolution in thinking. Therefore, the adoption of BIM requires a careful planning, selecting the right tools, training the entire system from top management downwards. The BIM strategy should equip the company with a thorough preparation from knowledge, skills and spirit to successfully adopt BIM” (Anabim Education, 2017).

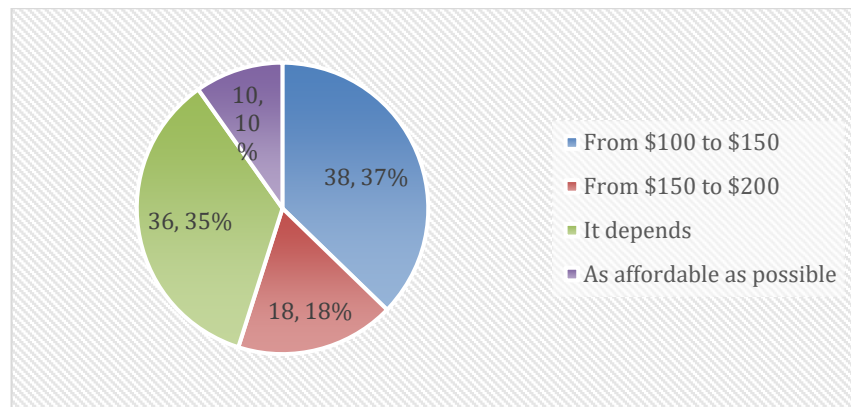


Figure 7. Response to the question on the expected fee

Regarding course fees, the largest proportion of respondents, i.e. 37%, agreed with the range from \$100 to \$150 for a 2-3-day course (see Figure 7). In addition to remarks that fees do not matter and/or depend on the magnitude of knowledge, some respondents said that there should be incentives as well as calls for funding from enterprises and NGOs. These remarks are noteworthy for those who intend to hold a BIM course, as fees are a big issue to consider for attendees. Learners will consider carefully whether or not they are involved, because tuition costs are relatively high, typically accounting for roughly 20-30% of their monthly salary (see Figure 8).

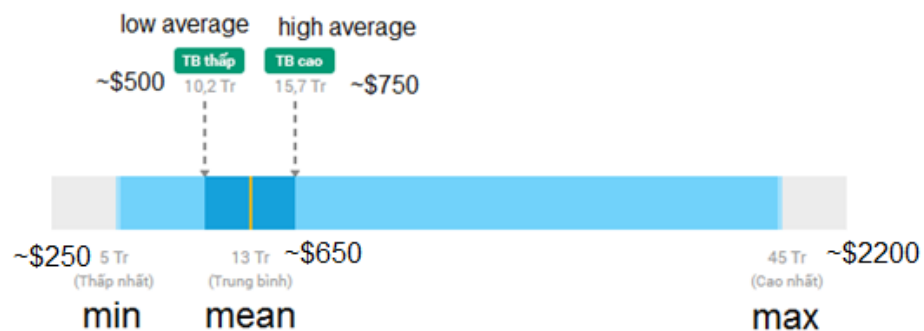


Figure 8. Monthly salary of construction engineer in Vietnam

Source: Career Builder (2018)

Figure 9 illustrates the prospects for BIM courses in the format of on-the-job training. Although only about 40% of respondents claimed there is a need, nearly 47% responded "Not sure." This signal is relatively good news for training providers, though they will need to try to persuade those people who are hesitating. Concurrently, it is necessary to keep informed the group in need, as well as find ways to approach people who are saying 'No' to on the job BIM courses.

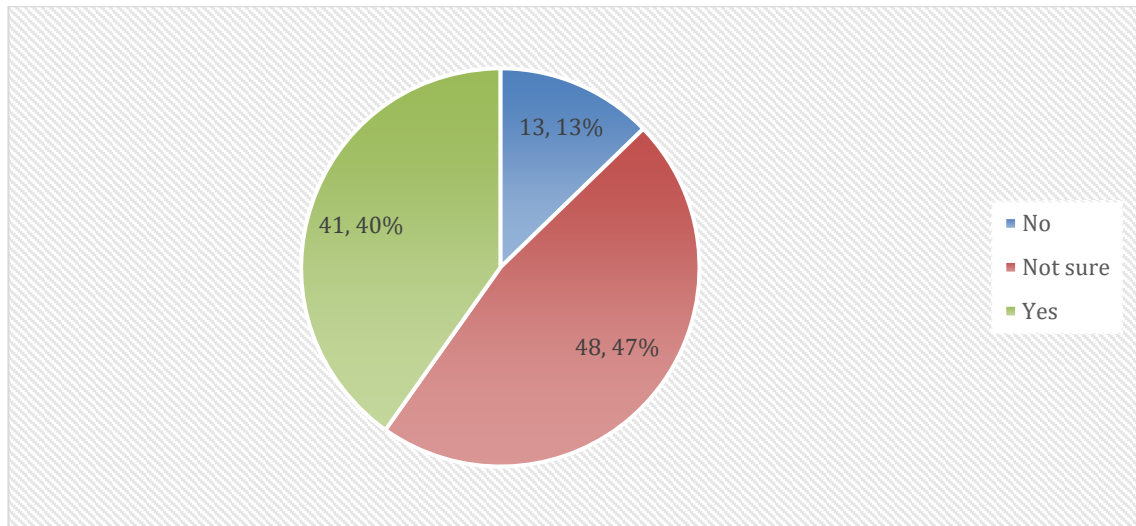


Figure 9. The response to the question "Do you need on-the-job training on BIM?"

4.3 Assessment of BIM practitioners

On occasion of application for the course of BIM for Practitioners, the author interviewed 30 applicants in two formats - face to face interview and interview by phone - on the period from 2nd to 7th of January 2018. The content of the interview is examining feedback on the necessity of contents incorporated into the government BIM Training Framework during the pilot phase (Ministry of Construction, 2017). Contents proposed by the Ministry of Construction are shown in Table 3.

Table 3. Contents incorporated in the BIM Training Framework during the pilot phase in Vietnam

Section	Contents	Learning hours	
		For personnel of Project management unit/Client	For personnel of consultant/contractor
I	Section I: BIM fundamentals	20	20
1	Overview of BIM	4	4
2	BIM environment, platforms and tools	4	4
3	Standards, guidance on BIM and BIM implementation at the project level	8	8
4	Developing BIM execution plan for	4	4
II	Section II: Knowledge and skills needed to adopt BIM		20
5	BIM for consultants and contractors		4
6	BIM and design analysis		4
7	Linked model and collaboration on the BIM platforms		4
8	Simulation of schedule on BIM platforms		4
9	Estimation on BIM platforms		4
III	Test and summary	8	8
1	Case studies	4	4
2	Q&As and test	4	4
	Grand total	28	48

The evaluation scale is to set a Likert score of 1-5 so that the respondent evaluates the necessity of each content, with 1 being Very Unnecessary, 5 being Very Important. The results are presented in Table 4.

Table 4. Feedbacks on the necessity of contents incorporated into the BIM Training Framework during the pilot phase in Vietnam proposed by MOC

No.	Contents	Mean	Mode	SD
1.	Overview of BIM	4.5667	5	0.7157
2.	BIM environment, platforms and tools	4.6667	5	0.6498
3.	Standards, guidance on BIM and BIM implementation at the project level	4.8333	5	0.3727
4.	Developing BIM execution plan for organisations	4.7333	5	0.5735
5.	BIM for consultants and contractors	4.8667	5	0.3399
6.	BIM and design analysis	4.7000	5	0.5859
7.	Linked model and collaboration on the BIM platforms	4.9000	5	0.3000
8.	Simulation of schedule on BIM platforms	4.4667	5	0.8055
9.	Estimation on BIM platforms	4.4000	5	0.8406
10.	Case studies	4.6667	5	0.5963
11.	Q&As and test	4.3333	5	0.7888

In general, the respondents were very enthusiastic about all the content proposed by the Ministry of Construction (the Modes all score 5 meaning very important). The "Linked model and collaboration on the BIM platforms" is considered to be the most necessary, with a very high average rating of 4.900 and the lowest standard deviation of only 0.3 indicating uniformity across respondents. In addition to the content "Q&As and test", although still reaching 4.400, the need for content on "Estimation on BIM platforms" received the lowest rating among 10 contents. This is understandable because the respondents' job roles are varied, not limited to QS or estimators, so their attention is beyond technical issues. What is more, there are two noteworthy items - those are "Simulation of schedule on BIM platforms" and "Q&As and test" having the highest standard deviation, respectively 0.8055 and 0.7888, shows a relatively large gap in the assessments of the importance of these two items among the respondents. Of course, there is a need for a broader survey to verify this framework, but the results of the interviews show a positive signal. To a certain extent, it can be said that the Ministry of Construction has proposed training subjects that closely follow the needs and requirements of professionals.

5 Conclusion and Further Research

This study used broadly quantitative data collection and analysis methods. A follow-up study using mixed methods analysis, or purely qualitative methods would help to add the richness and depth of information which has been gathered here. Although the survey and interview were carried out at a different time, they both give similar results. Subjects and contents are generally clear and relatively equal in terms of the need for short-term training courses, however, they need to co-ordinate closely in details both design and construction. This can be found in overseas studies on the BIM curriculum. Many claimed that the BIM learners' biggest shortcoming is to understand the multidisciplinary nature of model management. Moreover, standards, guidelines, strategy and plan for the implementation of BIM projects play vital roles. BIM – related practitioners around the world have ranked two issues as worthy attention to training BIM in the study. Despite

having little direct relevance to BIM education, many studies have shown that support of leaders is a critical factor in the success of implementing BIM. That is why there is a need to have a strategy in persuading firms' top managers to invest in the BIM human resources' development. On the ground, there is a huge gap between demand and reality in BIM training course provision in Vietnam. This gap occurs in the context that Vietnamese universities have not been able to develop undergraduate and postgraduate BIM programs. The Ministry of Construction then pulled the strings by issuing Decision No. 1056/QĐ-BXD upon the BIM educational framework during the pilot phase. The rest of the training implementation depends on the organizations providing BIM training services. Based on the Ministry of Construction's proposal and the identified needs of learners, professional training content increasingly need to be developed instead of merely teaching the use of tools in software or imitating overseas training programs.

6 Acknowledgement

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